

## Description of a New Species of *Pseudomys* (Rodentia: Muridae) from the Kimberley Region, Western Australia

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### Abstract

*Pseudomys laborifex* sp. nov. is described from 20 specimens collected from widely separated localities in the Kimberley region, Western Australia.

Of the tropical and subtropical small (<20 gm) *Pseudomys*, *P. laborifex* is difficult to distinguish on external characters from *P. hermannsburgensis* and *P. johnsoni* using either univariate or discriminant function analysis; it is readily distinguished from these and *P. chapmani* and *P. delicatulus* on skull characters. Phenetically it is closest to *P. johnsoni* on both skull and external characters.

### Introduction

*Pseudomys* Gray, 1832 is diagnosed by Thomas (1910) as containing Australian murid species that have a mammary formula of  $0+2=4$  (no pectoral mammae). The skull is lightly built, without supraorbital ridges; the interorbital region is narrow, parallel-sided with round, or in a few species, square edges.

The taxonomy of *Pseudomys* is unsettled. New species have recently been described (*P. chapmani* Kitchener, 1980; *P. pilligaensis* Fox and Briscoe, 1980; *P. johnsoni* Kitchener, 1985). Another (*P. bolami* Troughton, 1932) originally described as a subspecies of *P. hermannsburgensis* was recognised as a species by Kitchener *et al.* (1984) and doubts exist about the status of other named forms (e.g. *P. glaucus* Thomas, 1910, see Fox and Briscoe 1980).

A biological survey of the Prince Regent River Reserve resulted in the collection of a single specimen of *Pseudomys* that was considered by Dr Alex Baynes (in McKenzie *et al.* 1974) to be possibly an undescribed species. Since then further specimens of this Prince Regent River form have been collected from several other widely separated localities in the Kimberley Region (Lake Argyle, Drysdale River National Park and Mitchell Plateau) and 20 specimens are now available for study. These specimens were compared with other species of *Pseudomys* and found to warrant description as a new species. In this paper we diagnose this new species in detail against those small (<20 gm) tropical species of *Pseudomys* with which it could be confused, and more superficially against those other small *Pseudomys* with distributions lying mainly, or completely to the south of the

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Tropic of Capricorn. It is also briefly diagnosed against the sympatric *P. nanus* (Gould, 1858) with which it would not be confused readily.

## Methods

### Measurements

Twenty one skull (including dentary and teeth) and six external characters (listed in Table 1) were recorded from 17 adult *P. laborifex* (11 ♂, 6 ♀). The measurements, in millimetres, were recorded as shown in Kitchener (1985:Fig. 1). Measurements of the holotype of *P. laborifex* are presented in the appendix. Terminology for vibrissae and other external characters follows Wood Jones (1923). Hair counts on the tail were taken as the number of hairs round the circumference of the tail at a point 1 cm from the anus. Measurements for *P. chapmani* (Pilbara District, Western Australia), *P. hermannsburgensis* (central Northern Territory), *P. delicatulus* (Kimberley and Pilbara Districts, Western Australia), *P. johnsoni* (central Northern Territory) and *P. bolami* (Goldfields District, Western Australia) and the type specimens examined are those presented in Kitchener (1985). Registration numbers of specimens are of the Western Australian Museum.

### Ageing

Specimens were regarded as adult after consideration of a combination of: body weight, ossification of cranial sutures, tooth wear and general development of the reproductive tract and gonads. Adults only were included in our statistical appraisal.

### Univariate Analysis

Means and standard deviations were obtained for all adult skull and external body characters. For each species all characters were examined for sexual dimorphism using t-test for unequal sample size. *A posteriori* multiple comparisons were conducted using analysis of variance and the GT2 follow up procedure at  $\alpha = 0.05$  (Sokal and Rohlf 1981).

### Multivariate Analysis

Cranial and external characters were examined separately using multiple discriminant analysis (Davies 1971). Five individuals and four variables (body weight, nasal length, M<sup>3</sup> length and coronoid-angle length) were dropped from the analysis due to missing data. Dendrograms were drawn from WPGMA cluster analysis of the range scaled data (Sneath and Sokal 1973) using euclidian distance.

## Systematics

### *Pseudomys laborifex* sp. nov.

Figures 1-5, Tables 1 and 2

### Holotype

Western Australian Museum Collection Registration No. M21961, adult female, in ethanol with skull separate, liver, heart and kidney removed and stored at -70° C, reproductive tract removed, fixed in Bouins and preserved in 70 percent ethanol.

## Type Locality

Adjacent to Camp Creek, Mitchell Plateau, Kimberley Region, Western Australia, 14°49'00"S, 125°50'25"E and altitude *c.* 270 m. Collected on 20 July 1982 by R. Collyer, J.L. Barnett and P. Presidente in a *Eucalyptus apodophylla* vegetation alliance of low woodland to low open woodland with an understorey of scattered shrubs comprising *Melaleuca viridiflora*, *Banksia dentata* and *Grevillea pteridifolia* over dense grasses to 2 m high including *Arundinella nepalensis*, *Pseudopogonatherum contortum* and *Themida australis* on fine light grey sandy silt which becomes very hard during the 'dry season' (Figure 1).

**Table 1** Skull and body characters of adults of five species of *Pseudomys*. Values are means, with standard deviations in bold type and sample size in parentheses.

Character	<i>P. laborifex</i>		<i>P. chapmani</i>		<i>P. johnsoni</i>		<i>P. hurgensis</i>		<i>P. delicatulus</i>	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
<b>SKULL</b>										
greatest length	22.9	22.9	22.7	22.4	23.9	24.3	22.3	22.3	20.3	20.6
	<b>0.45(11)</b>	<b>0.35(6)</b>	<b>1.14(7)</b>	<b>1.92(3)</b>	<b>0.59(7)</b>	<b>0.47(5)</b>	<b>0.60(3)</b>	<b>0.94(10)</b>	<b>0.33(5)</b>	<b>0.40(5)</b>
nasal length	8.0	8.3	7.7	7.3	8.3	8.6	7.5	7.7	7.1	7.3
	<b>0.30(11)</b>	<b>0.12(6)</b>	<b>0.57(7)</b>	<b>0.95(3)</b>	<b>0.44(7)</b>	<b>0.29(5)</b>	<b>0.67(3)</b>	<b>0.32(10)</b>	<b>0.35(3)</b>	<b>0.36(5)</b>
nasal width	2.1	2.2	2.1	2.0	2.1	2.2	2.2	2.2	2.0	2.0
	<b>0.13(11)</b>	<b>0.13(6)</b>	<b>0.12(8)</b>	<b>0.15(3)</b>	<b>0.21(7)</b>	<b>0.08(5)</b>	<b>0.10(3)</b>	<b>0.12(10)</b>	<b>0.15(5)</b>	<b>0.11(5)</b>
interorbital width	3.3	3.3	3.4	3.5	3.5	3.1	3.5	3.1	3.3	3.3
	<b>0.14(11)</b>	<b>0.17(6)</b>	<b>0.06(8)</b>	<b>0.15(3)</b>	<b>0.15(7)</b>	<b>0.24(5)</b>	<b>0.10(3)</b>	<b>0.13(10)</b>	<b>0.16(5)</b>	<b>0.04(5)</b>
zygomatic width	10.9	11.3	11.3	11.4	11.9	11.9	11.6	11.5	10.2	11.3
	<b>0.23(11)</b>	<b>0.34(6)</b>	<b>0.26(8)</b>	<b>0.71(3)</b>	<b>0.13(6)</b>	<b>0.26(5)</b>	<b>0.10(3)</b>	<b>0.36(10)</b>	<b>0.29(5)</b>	<b>0.28(5)</b>
mastoid width	8.8	8.7	9.1	9.1	9.2	9.3	9.3	9.3	8.1	8.3
	<b>0.32(11)</b>	<b>0.26(6)</b>	<b>0.23(8)</b>	<b>0.31(3)</b>	<b>0.16(7)</b>	<b>0.32(5)</b>	<b>0.38(3)</b>	<b>0.36(10)</b>	<b>0.66(5)</b>	<b>0.25(5)</b>
braincase width	10.4	10.4	10.9	10.8	11.0	10.9	10.8	10.8	9.9	9.8
	<b>0.17(11)</b>	<b>0.20(6)</b>	<b>0.27(8)</b>	<b>0.42(3)</b>	<b>0.17(7)</b>	<b>0.33(5)</b>	<b>0.15(3)</b>	<b>0.30(10)</b>	0.11(5)	<b>0.36(5)</b>
braincase depth	7.1	7.1	7.1	7.1	7.4	7.4	7.1	7.1	6.6	6.6
	<b>0.23(11)</b>	<b>0.28(6)</b>	<b>0.17(8)</b>	<b>0.10(3)</b>	<b>0.25(7)</b>	<b>0.27(5)</b>	<b>0.23(3)</b>	<b>0.21(10)</b>	<b>0.22(5)</b>	<b>0.30(5)</b>
interparietal width	7.3	7.3	6.1	6.0	7.5	7.7	7.8	7.9	7.2	6.8
	<b>0.28(11)</b>	<b>0.61(6)</b>	<b>0.36(8)</b>	<b>0.67(3)</b>	<b>0.31(7)</b>	<b>0.39(4)</b>	<b>0.70(3)</b>	<b>0.27(9)</b>	<b>0.40(5)</b>	<b>0.35(5)</b>
palatal length	12.3	12.3	11.7	11.5	12.3	12.6	11.4	11.4	10.0	10.2
	<b>0.31(11)</b>	<b>0.21(6)</b>	<b>0.55(8)</b>	<b>1.03(3)</b>	<b>0.30(7)</b>	<b>0.27(5)</b>	<b>0.23(3)</b>	<b>0.48(10)</b>	<b>0.19(5)</b>	<b>0.12(5)</b>
ant. palatal foramen length	3.9	4.0	3.5	3.5	3.7	3.8	4.1	4.3	3.8	3.7
	<b>0.21(11)</b>	<b>0.21(6)</b>	<b>0.18(8)</b>	<b>0.20(3)</b>	<b>0.11(7)</b>	<b>0.23(5)</b>	<b>0.21(3)</b>	<b>0.24(10)</b>	<b>0.19(5)</b>	<b>0.11(5)</b>
basicranial length	19.0	19.3	18.8	18.6	19.9	20.1	18.4	18.6	16.3	16.6
	<b>0.41(11)</b>	<b>0.41(6)</b>	<b>1.00(8)</b>	<b>1.70(3)</b>	<b>0.50(7)</b>	<b>0.54(5)</b>	<b>0.50(3)</b>	<b>0.82(10)</b>	<b>0.50(4)</b>	<b>0.30(5)</b>
bullae length	4.6	4.6	5.9	5.7	5.5	5.3	4.9	5.0	3.8	3.8
	<b>0.23(11)</b>	<b>0.08(6)</b>	<b>0.29(8)</b>	<b>0.20(3)</b>	<b>0.20(7)</b>	<b>0.09(5)</b>	<b>0.15(3)</b>	<b>0.20(10)</b>	<b>0.12(5)</b>	<b>0.04(5)</b>
bullae width	10.1	10.3	11.0	11.2	11.0	11.2	10.6	10.7	9.5	9.2
	<b>0.14(11)</b>	<b>0.30(6)</b>	<b>0.25(8)</b>	<b>0.50(3)</b>	<b>0.26(7)</b>	<b>0.40(5)</b>	<b>0.12(3)</b>	<b>0.28(10)</b>	<b>0.29(5)</b>	<b>0.67(5)</b>
upper molar row length	4.1	4.0	3.8	3.8	4.1	4.2	3.6	3.6	3.5	3.4
	<b>0.16(11)</b>	<b>0.19(6)</b>	<b>0.14(8)</b>	<b>0.31(3)</b>	<b>0.15(7)</b>	<b>0.18(5)</b>	<b>0.12(3)</b>	<b>0.13(10)</b>	<b>0.15(5)</b>	<b>0.18(5)</b>
M <sup>1</sup> length	2.2	2.2	2.1	2.1	2.2	2.3	1.9	1.9	1.9	1.9
	<b>0.12(11)</b>	<b>0.15(6)</b>	<b>0.10(8)</b>	<b>0.15(3)</b>	<b>0.06(7)</b>	<b>0.15(5)</b>	<b>0.06(3)</b>	<b>0.07(10)</b>	<b>0.05(5)</b>	<b>0.11(5)</b>
M <sup>1</sup> width	1.2	1.2	1.1	1.2	1.3	1.3	1.1	1.1	1.1	1.0
	<b>0.08(11)</b>	<b>0.05(6)</b>	<b>0.05(8)</b>	<b>0.06(3)</b>	<b>0.05(7)</b>	<b>0.05(5)</b>	<b>0.06(3)</b>	<b>0.05(10)</b>	<b>0.04(5)</b>	<b>0.05(5)</b>
M <sup>2</sup> length	0.9	0.9	0.8	0.7	0.9	1.0	0.8	0.8	0.7	0.8
	<b>0.06(11)</b>	<b>0.12(6)</b>	<b>0.05(8)</b>	<b>0.10(3)</b>	<b>0.06(7)</b>	<b>0.05(5)</b>	<b>0.06(3)</b>	<b>0.07(10)</b>	<b>0.08(5)</b>	<b>0.04(5)</b>

### Addendum

Using unweighted means the following values are altered in the Diagnosis as follows: *P. laborifex* ear length 12.1, upper molar row length 4.1, anterior palatal foramen length 3.9; *P. delicatulus*, snout to vent length 55.1, weight 8.1, greatest skull length 20.5; *P. johnsoni* pes length 17.5, greatest skull length 24.1; in the Description weight 11.8, pes 12.1.



Table 1 (continued)

<b>MANDIBLE</b>										
lower molar	3.6	3.6	3.4	3.4	3.7	3.8	3.3	3.3	3.1	3.0
row length	<b>0.14</b> (11)	<b>0.09</b> (6)	<b>0.14</b> (8)	<b>0.17</b> (3)	<b>0.15</b> (7)	<b>0.11</b> (5)	<b>0.12</b> (3)	<b>0.14</b> (10)	<b>0.09</b> (5)	<b>0.09</b> (5)
coronoid-	5.1	5.1	5.1	5.1	5.5	5.7	5.5	5.4	4.9	4.6
angle length	<b>0.31</b> (10)	<b>0.15</b> (4)	<b>0.39</b> (8)	<b>0.79</b> (3)	<b>0.25</b> (7)	<b>0.34</b> (5)	<b>0.17</b> (3)	<b>0.35</b> (10)	<b>0.46</b> (3)	<b>0.21</b> (2)
condyle-incisor length	14.2	14.4	13.7	13.8	14.5	14.9	13.4	13.6	12.2	12.4
	<b>0.21</b> (11)	<b>0.54</b> (6)	<b>0.69</b> (8)	<b>1.39</b> (3)	<b>0.49</b> (7)	<b>0.36</b> (5)	<b>0.25</b> (3)	<b>0.47</b> (10)	<b>0.20</b> (5)	<b>0.28</b> (5)
<b>EXTERNALS</b>										
snout-vent	63.9	65.4	60.7	59.9	68.8	70.5	68.3	68.8	53.2	56.8
length	<b>3.12</b> (9)	<b>5.55</b> (6)	<b>3.30</b> (6)	<b>10.96</b> (2)	<b>3.96</b> (7)	<b>6.18</b> (5)	<b>4.61</b> (3)	<b>5.57</b> (10)	<b>2.25</b> (6)	<b>4.25</b> (7)
tail length	76.9	75.8	79.1	83.8	82.8	85.9	77.1	80.5	71.1	67.6
	<b>5.16</b> (9)	<b>6.66</b> (6)	<b>8.69</b> (6)	<b>14.99</b> (2)	<b>6.58</b> (6)	<b>1.35</b> (4)	<b>3.64</b> (3)	<b>6.46</b> (8)	<b>8.80</b> (5)	<b>5.88</b> (7)
pes length	16.7	16.5	16.0	16.2	17.3	17.7	17.1	16.8	16.6	16.1
	<b>0.51</b> (8)	<b>0.21</b> (6)	<b>0.76</b> (6)	<b>1.48</b> (2)	<b>0.44</b> (7)	<b>0.58</b> (5)	<b>0.21</b> (3)	<b>0.74</b> (10)	<b>0.50</b> (6)	<b>0.62</b> (6)
ear length	12.0	12.3	10.5	10.1	12.1	12.2	13.2	13.5	11.7	11.7
	<b>0.36</b> (9)	<b>0.62</b> (5)	<b>0.81</b> (6)	<b>1.20</b> (2)	<b>0.44</b> (7)	<b>0.16</b> (5)	<b>1.02</b> (3)	<b>0.75</b> (9)	<b>0.78</b> (6)	<b>0.63</b> (7)
live weight	10.9	13.2	10.0	-	11.2	12.3	-	-	7.3	8.4
	<b>1.90</b> (8)	<b>3.03</b> (5)	<b>1.73</b> (3)	<b>7.50</b> (1)	<b>2.17</b> (5)	<b>3.30</b> (4)	-	-	<b>0.58</b> (3)	<b>1.37</b> (7)
hairs/scale	37.0	38.5	38.2	41.0	36.5	37.2	40.7	40.7	34.7	33.3
row	<b>3.07</b> (11)	<b>1.87</b> (6)	<b>2.64</b> (6)	0 (2)	<b>4.59</b> (6)	<b>4.32</b> (5)	<b>3.06</b> (3)	<b>2.16</b> (10)	<b>2.94</b> (6)	<b>3.30</b> (7)

**Paratypes** (all adults in ethanol with skull separate unless otherwise specified).

Lissadell Homestead, Western Australia (16°38'20"S, 128°27'00"E), 4 ♂, M (19273, 19281-2, 19284); Mitchell Plateau, W.A. (14°49'30"S, 125°49'30"E), 1 ♂, M21528; (14°52'20"S, 125°49'15"E), 1 ♂, M21766; (14°48'00"S, 125°49'35"E), 1 ♂, M21764; (14°49'20"S, 125°50'30"E), 1 ♂ (juvenile), M21962; (14°35'15"S, 125°45'30"E), 2 ♂, M (18072-3); Drysdale River National Park, W.A. (15°09'S, 127°06'E), 1 ♀, M14297, 1 ♂, 1 ♀ (both juvenile), M(14296, 14298); (15°17'S, 127°12'E), 2 ♂ (skull, skin and dried body separate), M(14301-2), 3 ♂, M(14299, 14300, 14303); Prince Regent River Reserve, W.A. (15°26'12"S, 125°36'42"E), 1 ♀, M12315.

### Diagnosis (mean and range values)

*Pseudomys laborifex* differs from *P. chapmani* in having a larger average ear length 12.2(11.6-13.4) v. 10.4 (9.2-11.6); interparietal wider relative to greatest skull length 0.32(0.30-0.35) v. 0.27(0.25-0.30); both upper and lower molar rows average longer 4.0(3.8-4.3) v. 3.8(3.5-4.1) and 3.6(3.4-3.9) v. 3.4(3.2-3.6) respectively; bulla length much less 4.6(4.2-4.9) v. 5.8(5.5-6.0). It differs from *P. hermannsburgensis* in having a narrower interparietal relative to greatest skull v. 0.35(0.33-0.37); bulla shorter relative to greatest skull length 0.20(0.19-0.21) v. 0.22(0.21-0.24); anterior palatal foramen average shorter 4.0(3.6-4.3) v. 4.3(3.9-4.7); upper and lower molar rows average longer v. 3.6(3.4-3.7) and v. 3.3(3.1-3.5) respectively; M<sup>1</sup> first loph more elongate, labial cusps more reduced. It differs from *P. delicatulus* in being larger for most characters: Snout to vent length 64.5(56.4-71.1) v. 54.6(50.2-61.7), total body weight 11.8(8.3-17.0) v. 7.6(6.0-10.0), greatest skull length 22.9(22.2-23.5) v. 20.4(20.0-21.0), upper molar row crown length v. 3.5(3.2-3.7), bulla longer v. 3.8(3.6-3.9); anterior palatal foramen shorter and does not extend beyond a point level with the anterior edge of M<sup>1</sup> alveolus; parapterygoid fossa narrower.



**Table 2** Discriminant function scores for the variables used for both skull and external characters of five species of *Pseudomys* (*laborifex*, *chapmani*, *delicatulus*, *hermannsburgensis* and *johnsoni*). Canonical variate values for an individual specimen are calculated by the summation of the products of each character value with its function score.

	Factor No.			
	I	II	III	IV
<b>SKULL</b>				
greatest length	-0.003	-0.237	-0.099	-0.114
nasal width	-0.115	-0.110	0.074	0.398
interorbital width	-0.146	-0.154	0.108	0.032
zygomatic width	0.007	-0.045	0.110	-0.227
mastoid width	-0.026	-0.111	0.160	0.215
braincase width	0.237	-0.105	-0.234	0.072
braincase depth	-0.004	0.240	0.043	-0.122
interparietal width	-0.129	0.010	0.105	-0.155
palatal length	0.025	0.514	0.116	0.438
ant. palatal foramen length	-0.157	-0.140	0.214	0.369
basicranial length	-0.170	0.085	0.063	-0.084
bulla length	0.623	-0.153	0.062	0.109
bulla width	0.128	0.046	0.036	-0.032
upper molar row length	-0.001	0.028	-0.199	-0.233
M <sup>1</sup> length	0.366	0.026	-0.499	0.255
M <sup>1</sup> width	-0.507	0.655	0.726	-0.453
<b>MANDIBLE</b>				
lower molar row length	-0.157	0.274	0.148	-0.058
condyle-incisor length	0.123	-0.017	-0.078	-0.079
$\chi^2$	141.5	113.9	90.2	41.0
df	21	19	17	15
% variation explained	53.1	27.8	15.5	3.6

<b>EXTERNAL</b>	I	II	III
snout to vent length	0.022	-0.231	0.019
tail length	-0.072	-0.074	-0.026
pes length	0.249	-0.156	0.953
ear length	0.964	0.939	-0.274
hairs/scale row	0.050	-0.185	-0.116
$\chi^2$	67.1	51.6	17.0
df	8	6	4
% variation explained	56.3	35.6	7.7

It differs from *P. johnsoni* in having its dorsal fur a brown rather than grey colour; pes length averages shorter 16.6(16.1-17.8) v. 17.4(16.8-18.5); greatest skull length averages shorter v. 24.0(23.0-25.9); bulla much shorter v. 5.4(5.1-5.7) and a greater intrusion of the occipital into the postsquamosal sinus.



Figure 1 Type locality of *P. laborifex* adjacent to Camp Creek Mitchell Plateau (Photo Dr R.A. How).

If a specimen cannot be distinguished on the above criteria then it may be diagnosed with the assistance of the discriminant function analysis presented herein.

*Pseudomys laborifex* is unlikely to be confused with other small (<20 gm) *Pseudomys* which have their distribution in or mainly in the parts of the continent to the south of the tropics, or with *P. nanus* with which it is sympatric. However, it differs from these as follows:

*P. bolami* in having its dorsal fur brown rather than olive; both its ears and pes considerably shorter; tail much less heavily furred; interparietal width shorter; anterior palatal foramen shorter and not extending beyond a point level with the anterior edge of the M<sup>1</sup> alveolus; interorbital width narrower relative to greatest skull length; upper and lower molar row crown lengths longer; M<sup>1</sup> first loph more elongate; parapterygoid fossa narrower. *P. desertor* in lacking a conspicuous ring of pale orange fur around the eye; skull smaller; anterior palatal foramen not narrowed posteriorly; molar teeth smaller and less robust; upper molar lingual cusps much less developed, M<sup>1</sup> occlusal surface elongate rather than oval in outline, first loph longer; bulla length much smaller. *P. albocinereus* and *P. apodemoides* in having dorsal fur a brown rather than blue-grey colour; skull smaller with proportionately shorter rostrum; bulla relatively longer; molar row longer; M<sup>1</sup> occlusal surface elongate rather than oval in outline, first loph considerably longer; anterior palatal foramen shorter, not extending beyond a point level with the anterior edge of the M<sup>1</sup> alveolus. *P. pilligaensis* in having dorsal fur a brown rather than grey-fawn colour; tail considerably longer rather than subequal to snout to vent length; body and skull larger; bulla longer relative to greatest skull length; molar rows longer; first loph of M<sup>1</sup> longer; labial cusps of M<sup>1</sup> less well developed; anterior palatal foramen



not extending beyond a point level with the anterior edge of the  $M^1$  alveolus. *P. novaehollandiae* in having dorsal fur a brown rather than silver flecked with light brown colour; bulla slightly larger; anterior palatal foramen shorter, does not extend beyond a point level with the anterior edge of  $M^1$  alveolus; upper molar row longer;  $M^1$  occlusal surface elongate rather than oval in outline with first loph longer; labial cusps on upper molars more reduced; parapterygoid fossa narrower. *P. nanus* in having dorsal fur a brown rather than a fawn colour; tail longer rather than subequal to snout to vent length; all body and skull measurements considerably shorter; rostrum relatively longer; anterior edge of zygomatic plate less concave; bulla less inflated; parapterygoid fossa shallower; upper molar row labial and lingual cusps less well developed; anterior palatal foramen shorter and not extending beyond a point level with the anterior edge of  $M^1$  alveolus.

## Description

### *Skull and Dentary* (Figure 2)

Nasals exceed premaxillae anteriorly; slight to moderate lachrymal wings as supraorbital protuberances; anterior edge of zygomatic plate vertical or gently sloping forward, straight or very slightly concave near base; outline of parietosquamosal suture sigmoidal; blunt projection of occipital intrudes approximately half way along dorsal edge of postsquamosal sinus; anterior palatal foramen short, generally extending posteriorly to a point level with or just anterior to a line joining the anterior edge of  $M^1$  alveoli; anterior half of median palatal septum inflated, premaxillary and maxillary septal suture near middle; presphenoid narrowing sharply anteriorly, with slight upward expansion encircling optic foramen; mesopterygoid fossa variable, ranging from parallel sides with no obvious widening posteriorly (M19284) to moderately widened posterior (M21766); parapterygoid fossa moderately deep and narrow; bulla length small relative to greatest skull length (see Figure 3 for comparison with other *Pseudomys* considered in detail); interparietal width moderate relative to skull length.

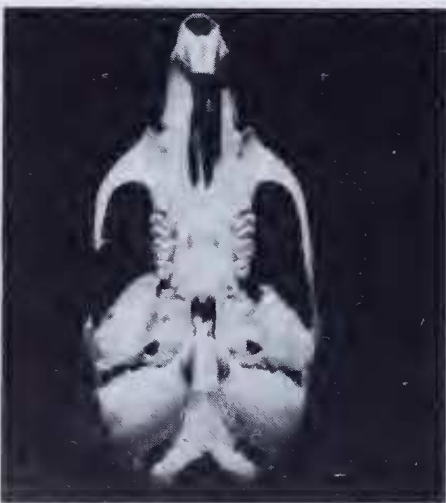
### *Dentition* (Figure 2)

Upper incisor opisthodont; molar cusp laminae gently tilted upwards; labial cusps reduced, particularly upper molar row; upper molar row long;  $M^1$  occlusal surface oval in outline, elongate first loph usually with a small to moderate accessory anterolingual cusp, although this is vestigial in three specimens M(14297, 12315, 18072); first loph of  $M_1$  slightly bicuspid.

### *External Morphology* (Figures 4 and 5)

Small 13.0(8.3-17.0) gm; tail length 119(104-135) percent of total body length; ear and pes moderate length 12.2(11.6-13.4) and 16.6(16.1-17.8) respectively. Plantar pads moderate size, particularly interdigital and hallucal pads, second interdigital pad reaches anteriorly approximately three-quarters the length of third interdigital pad; distance

Description of a new species of *Pseudomys* from the Kimberley Region



◀ Figure 2 Skull, dentary and occlusal view of RHS upper molar row of *P. laborifex* holotype. Molar row and ventral aspect of the skull as stereopairs. Scale lines; upper molar row, 1 mm; skull and dentary, 10 mm.

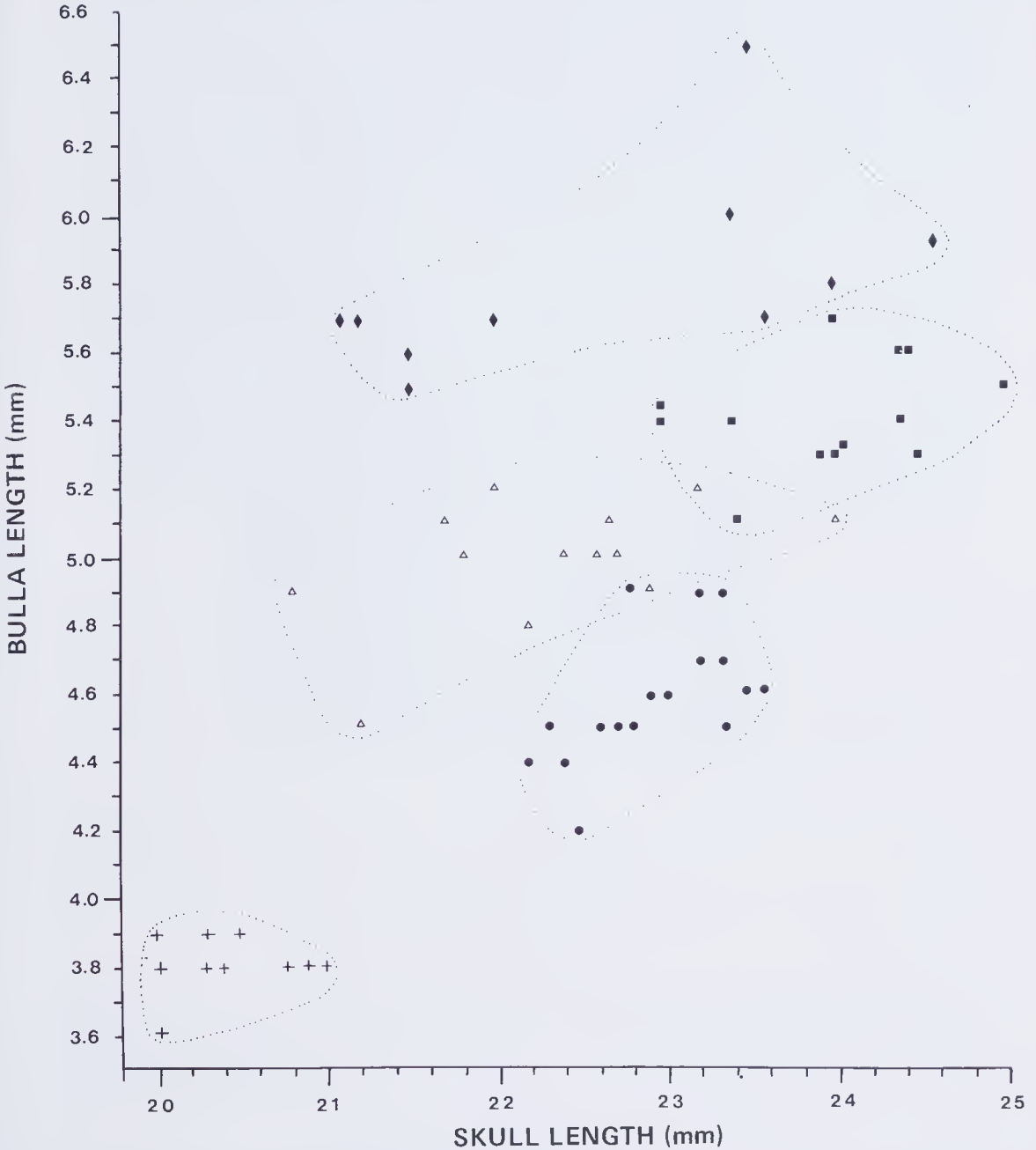


Figure 3 Length of bulla versus greatest skull length for adult *Pseudomys laborifex* (●); *P. chapmani* (◆); *P. hermannsburgensis* (△); *P. delicatulus* (+) and *P. johnsoni* (■).



Figure 4 *Pseudomys laborifex* holotype, left pes plantar surface. Scale line, 5 mm.

between pads variable, but generally metatarsal pad, hallucal pad and post hallucal pad approximately equidistant from each other (Figure 4).

#### *Pelage and Skin Colour*

Described following Ridgway's (1912) colour standards (capitalised), on two 'puppet' skins (M14301-2).

Hairs on shoulder, back and flanks up to 6.2 mm long, base of hairs Neutral Gray, distal 2 mm Clay, lightly tipped with Sepia. Hairs on forehead, rostrum and sides of face shorter (4.5 mm) with distal one-third Clay, tipped with Sepia. Ears lightly furred with 2 mm long hairs, these Hair Brown on outer and White on inner surfaces. Guard hairs on dorsum numerous up to 10.5 mm long, Black, on flanks less numerous, shorter (9.5 mm), White tipped. Hairs on ventral surface of body, throat, chin, sides of mouth, manus and



Figure 5 *Pseudomys laborifex*, captured at Mitchell Plateau in January 1982 and photographed live by Dr C. Kemper.

pes White — which contrasts sharply with Cinnamon Buff of lateral surfaces; basal one-third of ventral hair 4.5 mm long and Light Mouse Gray. Guard hairs on venter and abdomen less numerous, up to 7.0 mm long, White.

Hairs on tail 1.5 mm long, averaging 37.5 hairs/scale row; on dorsal surface of tail hairs Deep Grayish Olive, on ventral surfaces White. No terminal tuft of hair on tail. Up to 35 mystacial vibrissae, posteriorly these are up to 25 mm long, mostly Sepia but tipped with White, on edge of lips shorter (9 mm) and White. Two genal vibrissae — one long (up to 13.5 mm) and the other about three-quarters this length, Sepia; a single long (16 mm) supraorbital vibrissa; two short (6.4 mm) White interramal vibrissae.

Skin of pes and manus Pinkish Buff. Skin of ear Snuff Brown. Ventral skin of tail Ivory Yellow, dorsal skin Buffy Olive.

### Etymology

The name *laborifex* is neolatin for 'labour making', an allusion to the great effort required to collect the specimens which form the basis of this description.

### Distribution and Habitat

*Pseudomys laborifex* is known only from the Kimberley Region, Western Australia, where it occurs at widely separated localities (Figure 6).



*Pseudomys laborifex* occurs in a wide range of habitats. At Mitchell Plateau it is found on the laterite Plateau surface in vegetation ranging from open low woodland dominated by *Eucalyptus latifolia* or *E. tetradonta* with scattered *Livistona eastonii* palms to well drained volcanic soils with basalt exposures dominated by *L. eastonii* to riparian situations such as are described for the type locality. Near the Drysdale and Prince Regent Rivers it occurs in "valley woodlands", on both heavy soils vegetated with *Melaleuca* spp. and *Cochlospermum fraseri* and on sandy soils with sandstone and mudstone boulders vegetated with *Eucalyptus* spp., *Erythrophleum chlorostachys* and *Acacia translucens* or *Eucalyptus* spp., *Owenia vernicosa*, *Ficus* sp. and *Acacia* sp. In both these latter situations the ground cover is a mosaic of spinifex and cane grass (McKenzie *et al.* 1974, McKenzie *et al.* 1977). Near Lake Argyle it was in a "valley" low open woodland of *Eucalyptus brevifolia* over *Plectrache pungens* on a stony rise of reddish sandy loam (Harold 1982).

### Morphometric Analyses: Results and Discussion

#### Univariate Analysis

The species by character statistics are shown in Table 1. Sexual dimorphism was detected ( $\alpha = .05$ ) in only one of 120 comparisons (zygomatic width in *P. laborifex*;  $t = 2.38$ ,  $df = 13$ ,  $P = 0.03$ ), so subsequent analysis was conducted on the sexes combined.



Figure 6 Distribution of *P. laborifex* in the Kimberley Region, Western Australia.

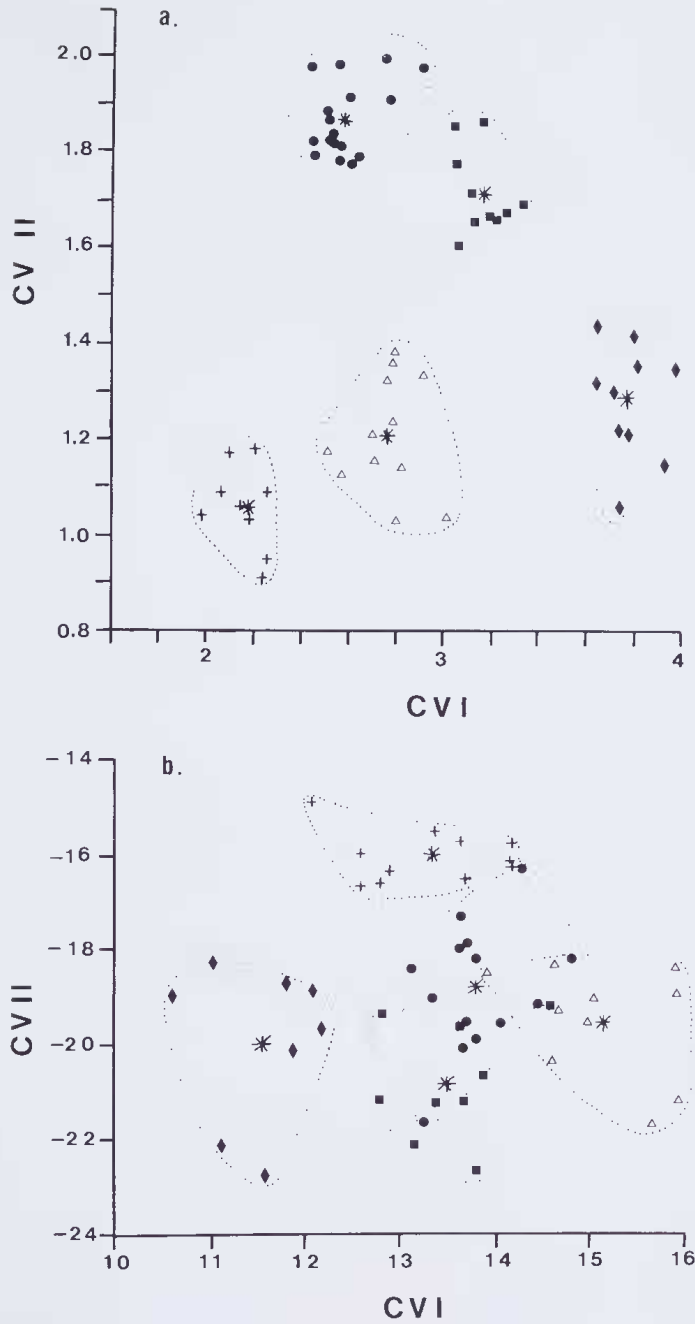


Figure 7 Discriminant function plot of (a) skull characters and (b) external characters, of combined male and female adult *P. laborifex* (●), *P. chapmani* (◆), *P. hermannsburgensis* (△), *P. delicatulus* (+) and *P. johnsoni* (■). Group means, ★.

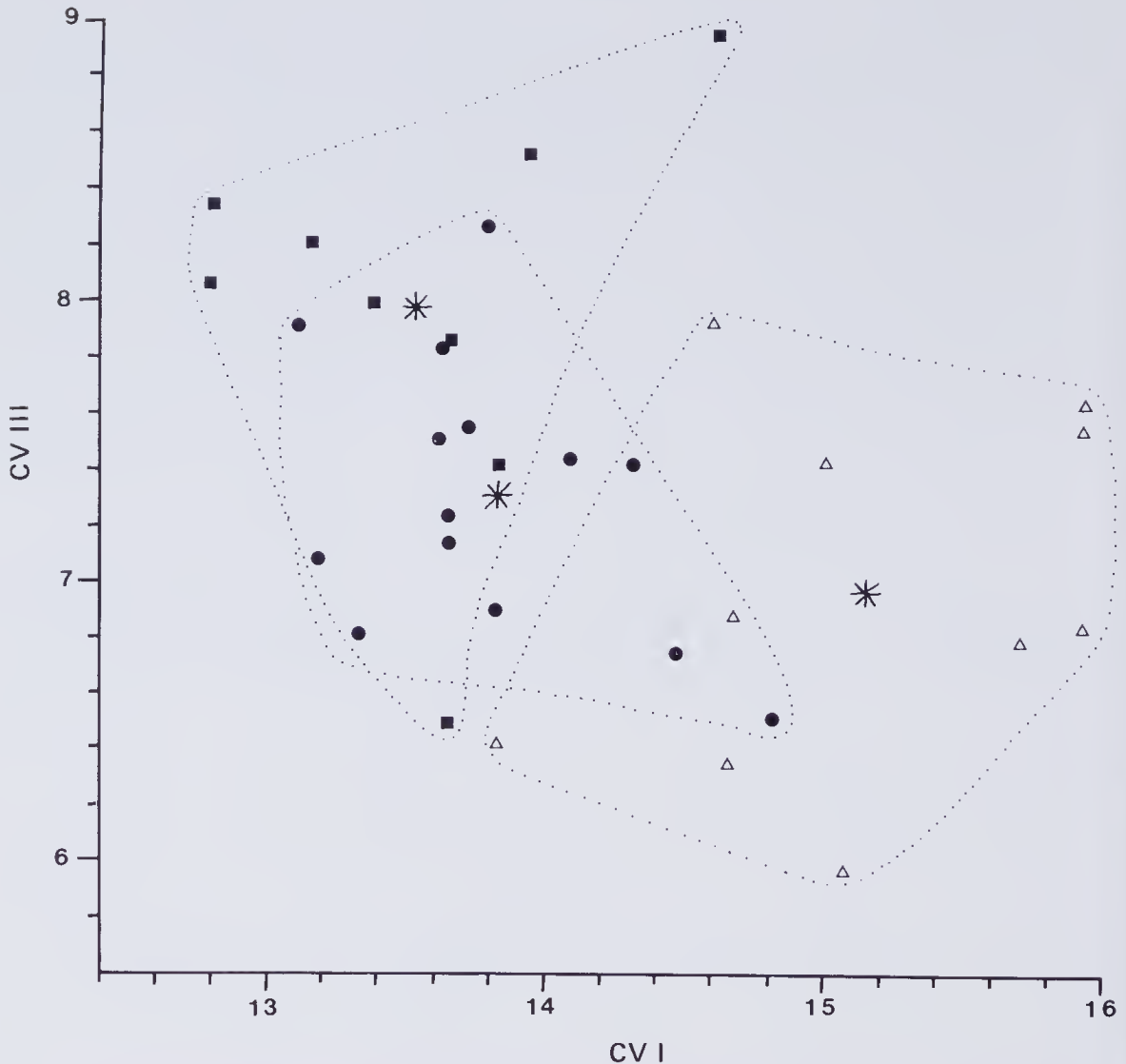


Figure 8 Discriminant function plot of external characters of combined male and female adult *P. laborifex* (●), *P. hermannsburgensis* (△) and *P. johnsoni* (■). Group means, ★.

### Multiple Discriminant Analysis

This analysis extracted four significant vectors from skull characters and three from external characters. The discriminant function statistics are given in Table 2. Vectors I and II of skull measurements were adequate to give complete separation of the five species of *Pseudomys* (Figure 7a). Vectors I and II of external measurements separate *P. laborifex* from *P. chapmani* and *P. delicatulus* (Figure 7b). Vectors I and III on external characters of *P. laborifex*, *P. johnsoni* and *P. hermannsburgensis* does not allow *P. laborifex* to be separated from these other two species, although it does allow *P. johnsoni* to be separated